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August 19, 2011
Project No. 8128.01.20

Mr. Dana Bayuk
Oregon Department of Environmental Quality
2020 SW 4th Avenue
Portland, Oregon

Re: Proposed Reduction of Performance Monitoring Program - Siltronic Corporation

Dear Mr. Bayuk:

The following letter includes a recommendation to reduce the field screening and analytical scope of groundwater monitoring at the Siltronic Corporation (Siltronic) facility. The revised scope presented below is focused on providing data for demonstrating progress toward achieving the remedial action objectives (RAOs) set forth in the August 31, 2009 Performance Monitoring Plan[1]. The recommendation to remove analytes from the performance monitoring scope is based on the bimonthly (Group 1 and 2) or monthly (Group 3) performance monitoring data collected to date, which are discussed in this letter. The recommendation to reduce the number of wells used for dense, non-aqueous phase liquid (DNAPL) screening is based upon data from the screening program designed by Oregon Department of Environmental Quality (DEQ) and implemented from August 2009 to date.

The following analytes of interest[2] (AOIs) are recommended for discontinuation: Total and dissolved organic carbon (TOC/DOC), volatile fatty acids (VFAs), anions (sulfide, nitrate, nitrite) and cyanide (total, free, weak-acid dissociable, and available). Tables 1 and 2 (respectively) summarize the following information for Groups 1/2 and 3:

- Initial basis for AOI inclusion
- Status of detections
- General trends
- Basis for discontinuation.

[1] These RAOs are subsequently referred to as RAO 1 (TCE concentrations below 11,000 ug/L in the source area) and RAO 2 (concentrations of TCE and its degradation products below Joint Source Control Strategy (JSCS) Screening Level Values (SLVs) at the riverbank).

[2] This term is used to identify the broader class of analytes quantified by the laboratory, some of which are naturally occurring (e.g., nitrogen species and organic carbon) and which are not within the subset of analytes identified as chemicals or contaminants of interest (COIs).

The following monitoring wells are recommended for removal from the DNAPL screening program:

WS13-69	WS32-76
WS18-101	WS35-106
WS19-101	WS36-81
WS30-96	WS39-101

These wells meet the criteria specified by DEQ in the June 2, 2011 email, in that they are equipped with dedicated sampling pumps and DNAPL has not been detected, observed, or measured during the DNAPL screening program. Table 3 (attached) summarizes the DNAPL screening data collected from these wells to date.

Other wells in the source area merit further discussion. WS-32-106 has not been screened for DNAPL as the dedicated pump remains immovable due to an obstruction in the well screen. The location of the pump prevents further screening for DNAPL. However, based on the analytical data for TCE (i.e., less than 100 ug/L since December 2009 and most recently non-detect), the presence of TCE DNAPL in this well is an extremely low probability[3].

Monitoring well WS-15-85 was not included in the DNAPL screening program as it is located upgradient of the injection zone, and below the injection threshold (11,000 ug/L TCE in groundwater). At DEQ's request, MFA completed MGP DNAPL screening in this well on June 17, 2011. MGP DNAPL was detected in the bottom of the well; the measured thickness (using an interface probe) was 5.2 ft. A sample was collected and submitted for analysis. As cis-1,2-DCE was detected in the sample, MFA recommends continuing DNAPL screening in this well consistent with the current program and groundwater monitoring schedule. As previously stated to DEQ, Siltronic will continue to provide access for NW Natural and their representatives if additional sampling for MGP DNAPL constituents is warranted.

Monitoring well WS-43-36 is located in the supplemental injection area and was installed during April, 2011. On June 17, 2011, MGP DNAPL was detected in the bottom of this well; the measured thickness (using an interface probe) was 8.2 ft. A sample was collected and submitted for analysis. DNAPL screening will continue in this well consistent with the current program and groundwater monitoring schedule.

TOTAL/DISSOLVED ORGANIC CARBON AND VOLATILE FATTY ACIDS

TOC/DOC and VFA were initially included in the performance monitoring program to confirm EHC distribution and reactions in the source area (monitored by Group 1 and 2

[3] TCE concentrations above 11,000 ug/L are indicative of the potential for DNAPL to be present.

PMWs). TOC/DOC and VFA concentrations in Group 1 and 2 wells showed significant increases as a result of the EIB injections. EHC distribution and reactions have also been effectively demonstrated by the following:

- TCE concentrations below RAO 1
- Increased concentrations of iron

TOC/DOC and VFAs are not AOIs for the Siltronic site. MFA does not anticipate that these data will be used to make decisions regarding the effectiveness of source control. With respect to the ongoing Supplemental Injection Program (SIP), ongoing collection of total and dissolved iron will be sufficient for demonstrating distribution of EHC.

TOC/DOC and VFA were initially included in the performance monitoring program in the Group 3 wells to evaluate aquifer conditions and serve as an indicator of the arrival of treated groundwater from the source area. Concentrations in Group 3 wells have showed no significant increase, and have consistently been 2-3 orders of magnitude lower than Group 1 and 2 wells. VFA concentrations in Group 3 wells have been mostly non-detect since installation, with occasional detections just above MRLs.

The arrival of treated groundwater in the Group 3 PMWs will be confirmed using VOC and chloride data, which are not proposed for discontinuation. For these reasons, TOC/DOC and VFAs should be discontinued from the performance monitoring program.

ANIONS

Sulfide, nitrate, and nitrite are ORP-sensitive anions and were included in the performance monitoring program to monitor redox conditions. Field parameters (dissolved oxygen [DO], pH, and ORP) are also currently used to monitor redox conditions.

Since completion of the injections, sulfide and nitrite have been largely non-detect (see Table 4). When detected, nitrate has been detected at low concentrations. Additionally, redox conditions can effectively be monitored by field parameters. For these reasons, it is recommended that sulfide, nitrate, and nitrite be discontinued from the performance monitoring program.

CYANIDE SPECIES

In a letter from DEQ dated February 4, 2010, DEQ approved Siltronic's proposal to discontinue sampling for certain analytes listed in section 2.4.6 of the Performance Monitoring Plan, with the exceptions of manganese and cyanide.

Per the letter:

> Cyanide is an MGP chemical of interest for the site and the subject of ongoing investigations of MGP contamination on properties owned by Siltronic and NW Natural. Siltronic asserts EIB decreases cyanide concentrations in groundwater. If this is the case, the cyanide dataset in PMWs should be maintained to further evaluate concentration trends upgradient and downgradient of Fab 1, and support SCMs planning. Furthermore, the suite of analyses should be expanded to include the "weak-acid dissociable" and "available" forms of cyanide determined using Standard Method 4500-CN-I and EPA OIA-1677, respectively

Per DEQ's request, the weak-acid dissociable and available forms of cyanide were added to the monitoring program beginning in February 2010.

In general, concentrations of free cyanide are non-detect with occasional detections just above MRLs. Concentrations of weak-acid dissociable cyanide, when detected, are typically stable. Concentrations of total cyanide have been decreasing or remain stable in all Group 1, 2, and 3 wells. Concentrations of amenable cyanide are somewhat variable (varying up to 2 orders of magnitude in an individual well), and in most wells, no overall trend is apparent.

Cyanide was included in the performance monitoring program at DEQ's request; however, data will not document progress toward either RAO. It is therefore recommended that cyanide (total, free, weak-acid dissociable, and available) be removed from the performance monitoring program. It is understood that that cyanide species are of interest for the RI and source control work conducted by NWN for MGP-related impacts on the Siltronic and NWN properties. Siltronic can continue to provide access to the Group 1, 2, or 3 PMWs and/or samples for cyanide analysis by NWN during ongoing performance monitoring.

PROPOSED ANALYTICAL SCOPE

The following analytes will remain part of the performance monitoring scope:

- VOCs, chloride, sulfate, and fixed gases will be used to monitor degradation of TCE and its daughter products.
- Iron (total and dissolved) will be used to monitor EHC distribution and reactions.
- Manganese (total and dissolved) will be included as a redox-sensitive species.
- Field parameters will (pH, DO, and ORP) will be used to monitor redox conditions.

No changes are proposed to the monitoring frequency at this time, with the following exceptions:

- WS-4x series wells (WS-40 through WS-43) were installed to monitor the effects of the SIP. These five wells will be monitored monthly until TCE concentrations are reduced to below the injection threshold (11,000 ug/L TCE in groundwater).
- WS-13-69 is located downgradient of the supplemental injection zones and closely corresponds to new well WS-41-91. This well will be monitored monthly consistent with the WS-4x wells.

The revised monitoring schedule (including DNAPL screening and water levels) is summarized on Table 5. We look forward to DEQ's review and comment regarding this proposal.

Sincerely,

Maul Foster & Alongi, Inc.

James Peale, RG
Senior Hydrogeologist

Erik Bakkom, PE
Senior Engineer

Attachments: Tables
Figure

cc: Tom McCue, Siltronic Corporation (electronic and hard copy)
Alan Gladstone, Davis Rothwell Earle and Xochihua (electronic and hard copy)
Chris Reive, Jordan Schrader Ramis (electronic and hard copy)
Jim Anderson, DEQ (electronic)
Kristine Koch, EPA (electronic)
Sean Sheldrake, EPA Seattle (electronic)
Rene Fuentes, EPA Seattle (electronic)
Chip Humphrey, EPA Portland (electronic)
Lance Peterson, CDM (electronic)
Bob Wyatt, NW Natural (electronic)
Patty Dost, Pearl Legal Group LLC (electronic)
John Edwards, Anchor QEA LLC (electronic)
Carl Stivers, Anchor QEA LLC (electronic)
Rob Ede, Hahn and Associates, Inc. (electronic)
Tom Gainer, DEQ (electronic)
Henning Larsen, DEQ (electronic)
Matt McClincy, DEQ (electronic)

TABLES

Table 1
Analytes of Interest
Groups 1 and 2
Siltronic Corporation
Portland, Oregon

Analyte of Interest (AOI)	Initial Basis for Inclusion	Status	Trend	Basis for Discontinuation from Group 1/2
Total CN	MGP-Related COI; reduced by EHC	Detected	Decreasing	Decreasing trend confirmed. AOI not related to RAO
Free CN		Not Detected	NA	Not detected. AOI not related to Siltronic RAOs.
Amenable CN		Detected - concentrations generally 1 OoM lower than total	Slight increase	Lower than total CN. AOI not related to Siltronic RAOs.
WAD CN				AOI not related to RAO.
VFAs	Fermentation byproduct confirms EHC distribution	Detected throughout and downgradient of injection zone	Increasing or increasing followed by decrease	Iron provides redundancy for EHC distribution; EHC/KB-1 performance confirmed by TCE below RAO 1. AOI not related to RAO.
Anions	ORP Indicator indicative of EHC/KB-1 performance	Detected throughout and downgradient of injection zone	Generally decreasing, some mixed	EHC/KB-1 performance confirmed by TCE below RAO 1. AOI not related to RAO.
TOC/DOC	Organic carbon confirms EHC distribution	Detected throughout and downgradient of injection zone	Increasing or increasing followed by decrease	Iron provides redundancy for EHC distribution; EHC/KB-1 performance confirmed by TCE below RAO 1. AOI not related to RAO.

Table 2
Analytes of Interest
Group 3
Siltronic Corporation
Portland, Oregon

	Initial Basis for Inclusion	Status	Trend	Basis for Discontinuation from Group 3
Total CN	MGP-related COI; CN appears to be reduced by EHC	Detected	Decreasing	Decreasing trend confirmed. AOI not related to Siltronic RAOs
Free CN		Not Detected	NA	Not detected. AOI not related to Siltronic RAOs.
Amenable CN		Detected - concentrations generally 1 OoM lower than total	Slight increase	Lower than total CN. AOI not related to Siltronic RAOs.
WAD CN			Mostly decreasing	Decreasing trend confirmed. AOI not related to Siltronic RAOs
VFAs	Fermentation byproduct tracer for source area groundwater	Not Detected	NA	VOCs and chloride are more reliable tracer. AOI not related to Siltronic RAOs.
Anions	ORP Indicator indicative of aquifer conditions	Only nitrate and sulfate detected	Generally decreasing, some mixed	AOI not related to Siltronic RAOs.
TOC/DOC	Comparison to Group 1/2 data; indicative of aquifer conditions.	Most values vary between 5-10 mg/L, except WS-23-116 (MGP DNAPL)	Generally unchanged	AOI not related to Siltronic RAOs.

Table 3
DNAPL Measurements Summary
Siltronic Corporation
Portland, Oregon

Required DNAPL Measurement Monitoring Wells																		
	WS13-69		WS-15-85		WS18-101		WS19-101		WS30-96		WS32-76		WS32-106		WS33-81		WS35-106	
Date	DNAPL Present (Y/N)	DNAPL in ft.	DNAPL Present (Y/N)	DNAPL in ft.	DNAPL Present (Y/N)	DNAPL in ft.	DNAPL Present (Y/N)	DNAPL in ft.	DNAPL Present (Y/N)	DNAPL in ft.	DNAPL Present (Y/N)	DNAPL in ft.	DNAPL Present (Y/N)	DNAPL in ft.	DNAPL Present (Y/N)	DNAPL in ft.	DNAPL Present (Y/N)	DNAPL in ft.
07/22/11	N	--	Y	4.8	N	--	N	--	N	--	N	--	*	*	Y	0.85	N	--
06/13/11	N	--	Y	5.20	N	--	N	--	N	--	N	--	*	*	Y	0.10	N	--
05/19/11	N	--	NS	--	N	--	N	--	N	--	N	--	*	*	Y	0.15	N	--
04/12/11	N	--	NS	--	N	--	N	--	N	--	N	--	*	*	Y	0.25	N	--
03/17/11	N	--	NS	--	N	--	N	--	N	--	N	--	*	*	Y	Trace	N	--
02/14/11	N	--	NS	--	N	--	N	--	N	--	N	--	*	*	Y	0.10	N	--
01/17/11	N	--	NS	--	N	--	N	--	N	--	N	--	*	*	Y	Trace	N	--
12/13/10	N	--	NS	--	N	--	N	--	N	--	N	--	*	*	Y	0.10	N	--
11/15/10	N	--	NS	--	N	--	N	--	N	--	N	--	*	*	Y	0.10	N	--
10/18/10	N	--	NS	--	N	--	N	--	N	--	N	--	*	*	Y	0.08	N	--
09/16/10	N	--	NS	--	N	--	N	--	N	--	N	--	*	*	Y	0.20	N	--
08/16/10	N	--	NS	--	N	--	N	--	N	--	N	--	*	*	Y	0.25	N	--
07/19/10	N	--	NS	--	N	--	N	--	N	--	N	--	*	*	Y	Trace	N	--
06/14/10	N	--	NS	--	N	--	N	--	N	--	N	--	*	*	Y	0.25	N	--
05/19/10	N	--	NS	--	N	--	N	--	N	--	N	--	*	*	Y	0.75	N	--
04/12/10	N	--	NS	--	N	--	N	--	N	--	N	--	*	*	Y	0.65	N	--
03/23/10	N	--	NS	--	N	--	N	--	N	--	N	--	*	*	Y	0.70	N	--
02/15/10	N	--	NS	--	N	--	N	--	N	--	N	--	*	*	Y	0.60	N	--
01/18/10	N	--	NS	--	N	--	N	--	N	--	N	--	*	*	Y	0.75	N	--
12/10/09	N	--	NS	--	N	--	N	--	N	--	N	--	*	*	Y	0.42	N	--
11/16/09	N	--	NS	--	N	--	N	--	N	--	N	--	*	*	Y	0.88	N	--

Table 3
DNAPL Measurements Summary
Siltronic Corporation
Portland, Oregon

Required DNAPL Measurement Monitoring Wells														
	WS36-81		WS39-101		WS40-36		WS41-36		WS41-91		WS42-36		WS43-36	
Date	DNAPL Present (Y/N)	DNAPL in ft.	DNAPL Present (Y/N)	DNAPL in ft.	DNAPL Present (Y/N)	DNAPL in ft.	DNAPL Present (Y/N)	DNAPL in ft.	DNAPL Present (Y/N)	DNAPL in ft.	DNAPL Present (Y/N)	DNAPL in ft.	DNAPL Present (Y/N)	DNAPL in ft.
07/22/11	N	--	N	--	N	--	N	--	N	--	N	--	Y	8.06
06/13/11	N	--	N	--	N	--	N	--	N	--	N	--	Y	8.20
05/19/11	N	--	N	--	Y	0.10	N	--	N	--	N	--	Y	10.34
04/12/11	N	--	N	--	N	--	N	--	N	--	N	--	Y	2.05
03/17/11	N	--	N	--	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
02/14/11	N	--	N	--	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
01/17/11	N	--	N	--	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
12/13/10	N	--	N	--	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
11/15/10	N	--	N	--	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
10/18/10	N	--	N	--	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
09/16/10	N	--	N	--	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
08/16/10	N	--	N	--	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
07/19/10	N	--	N	--	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
06/14/10	N	--	N	--	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
05/19/10	N	--	N	--	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
04/12/10	N	--	N	--	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
03/23/10	N	--	N	--	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
02/15/10	N	--	N	--	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
01/18/10	N	--	N	--	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
12/10/09	N	--	N	--	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
11/16/09	N	--	N	--	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Notes:

T = Trace amount detected.

* = Pump stuck at bottom of well, no NAPL Measurements taken.

NS - Not screened

Table 4
Percent Non-Detect - Anions
Siltronic Corporation
Portland, Oregon

Well ID	Sampling Events Completed	% Samples ND for Nitrate	% Samples ND for Nitrite	% Samples ND for Sulfide
Group 1				
WS13-105	11	36	91	91
WS13-69	12	42	83	92
WS15-140	11	73	100	100
WS15-85	11	27	100	91
WS19-101	12	58	92	83
WS19-71	11	45	91	82
WS30-96	12	42	100	83
WS31-106	12	33	100	92
WS32-106	12	42	100	83
WS32-76	12	58	100	75
WS34-106	12	50	92	83
WS34-71	12	33	92	92
WS35-106	12	42	100	67
WS35-76	12	17	100	50
WS37-51	12	42	100	92
Group 2				
WS18-101	13	38	100	77
WS18-71	13	69	100	77
WS33-106	12	42	100	75
WS33-81	12	50	100	83
WS36-106	12	50	100	67
WS36-81	12	33	100	92
WS38-61	12	50	100	83
WS39-101	12	33	100	92
Group 3				
WS21-112	21	48	90	95
WS21-131	20	60	85	95
WS23-116	20	45	100	85
WS24-111	20	30	85	100
WS24-126	20	80	95	100
WS24-155	21	67	90	95
WS25-96	20	50	90	90
WS25-111	20	55	90	95
WS26-86	20	30	95	95
WS26-116	20	50	75	95
WS27-86	20	55	95	100
Note:				
ND = non-detect	Average % ND	46	95	87

Table 5
Proposed Revised Monitoring Schedule
Siltronic Corporation
Portland, Oregon

Site ID	Groundwater Sampling					DNAPL Screening		Water Levels
	Gases	Iron+Mn	VOCs	Cl + SO_4	Ph, DO, ORP, Temperature	Thickness	VOCs	
WR-Stage	--	--	--	--	--	--	--	M
WS-8-33	--	--	--	--	--	--	--	M
WS-8-59	--	--	--	--	--	--	--	M
WS-9-34	--	--	--	--	--	--	--	M
WS-10-27	--	--	--	--	--	--	--	M
WS-11-125	Q	Q	Q	Q	Q	--	--	M
WS-11-161	S	S	S	S	S	--	--	M
WS-12-125	Q	Q	Q	Q	Q	--	--	M
WS-12-161	S	S	S	S	S	--	--	M
WS-14-125	Q	Q	Q	Q	Q	--	--	M
WS-14-161	S	S	S	S	S	--	--	M
WS-16-125	--	--	--	--	--	--	--	M
WS-16-161	--	--	--	--	--	--	--	M
WS-17-52	--	--	--	--	--	--	--	M
WS-17-94	--	--	--	--	--	--	--	M
WS-13-105	B	B	B	B	B	--	--	M
WS-13-69	M	M	M	M	M	--	--	M
WS-15-140	B	B	B	B	B	--	--	M
WS-15-85	B	B	B	B	B	M	A	M
WS-18-101	B	B	B	B	B	--	--	M
WS-18-71	B	B	B	B	B	--	--	M
WS-19-101	B	B	B	B	B	--	--	M
WS-19-71	B	B	B	B	B	--	--	M
WS-20-112	--	--	--	--	--	--	--	M
WS-22-112	--	--	--	--	--	--	--	M
WS-21-112	M	M	M	M	M	--	--	M
WS-21-131	M	M	M	M	M	--	--	M
WS-23-116	M	M	M	M	M	--	--	M
WS-24-111	M	M	M	M	M	--	--	M
WS-24-126	M	M	M	M	M	--	--	M
WS-24-155	M	M	M	M	M	--	--	M
WS-25-111	M	M	M	M	M	--	--	M
WS-25-96	M	M	M	M	M	--	--	M
WS-26-116	M	M	M	M	M	--	--	M
WS-26-86	M	M	M	M	M	--	--	M
WS-27-86	M	M	M	M	M	--	--	M
WS-30-96	B	B	B	B	B	--	--	M
WS-31-106	B	B	B	B	B	--	--	M
WS-32-106	B	B	B	B	B	--	--	M
WS-32-76	B	B	B	B	B	--	--	M

Table 5
Proposed Revised Monitoring Schedule
Siltronic Corporation
Portland, Oregon

Site ID	Groundwater Sampling					DNAPL Screening		Water Levels
	Gases	Iron+Mn	VOCs	Cl + SO_4	Ph, DO, ORP, Temperature	Thickness	VOCs	
WS-33-106	B	B	B	B	B	--	--	M
WS-33-81	B	B	B	B	B	M	A	M
WS-34-106	B	B	B	B	B	--	--	M
WS-34-71	B	B	B	B	B	--	--	M
WS-35-106	B	B	B	B	B	--	--	M
WS-35-76	B	B	B	B	B	--	--	M
WS-36-106	B	B	B	B	B	--	--	M
WS-36-81	B	B	B	B	B	--	--	M
WS-37-51	B	B	B	B	B	--	--	M
WS-38-61	B	B	B	B	B	--	--	M
WS-39-101	B	B	B	B	B	--	--	M
WS-40-36	M	M	M	M	M	--	--	M
WS-41-36	M	M	M	M	M	--	--	M
WS-41-91	M	M	M	M	M	--	--	M
WS-42-36	M	M	M	M	M	--	--	M
WS-43-36	M	M	M	M	M	M	A	M

Notes:
B - Bimonthly (even numbered months)
M - Monthly
Q - Quarterly (Feb, May, August, November)
S - Semiannual (May, November)
A - As needed/if sampled

FIGURE

Source: Aerial photograph obtained from ESRI, Inc. ArcGIS Online/Bing Maps

Legend

- Water Level Monitoring Only

Sampled Wells

- Bimonthly (even numbered months)
- Monthly
- Quarterly (Feb, May, Aug, Nov)
- Semiannual (May, Nov)

Figure 1
Well Locations and Sampling Frequency

Siltronic Corporation
Portland, Oregon

0 125 250
Feet

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Path: X:\8128.01 Siltronic Corp\20\Projects\Fig1_Well Locations and Sampling Frequency.mxd
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